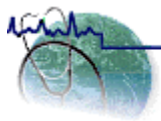
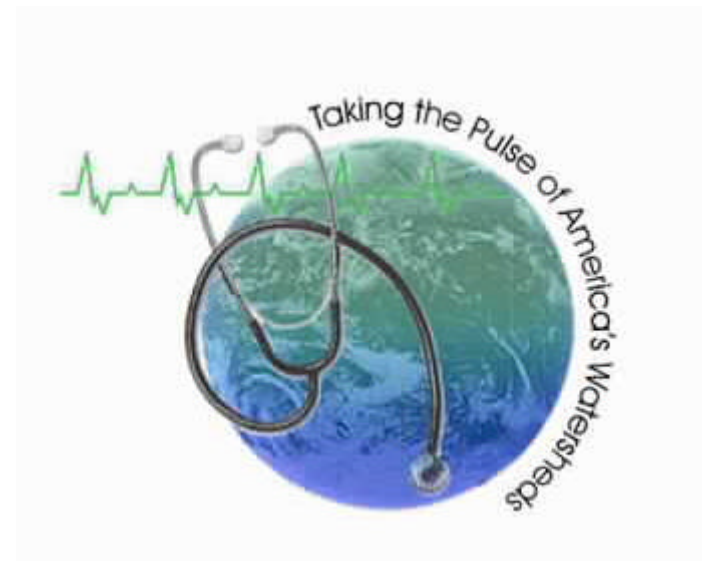


The Index of Watershed Indicators

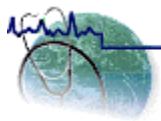
(<http://www.epa.gov/surf/iwi>)

- National presentation of aquatic resource health
- Watershed condition and vulnerability



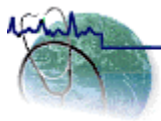
What Does IWI Do ?

- Characterize watershed condition and vulnerability
- Provide basis for management dialog
- Empower citizens
- Measure progress toward EPA's Goals of healthy watersheds

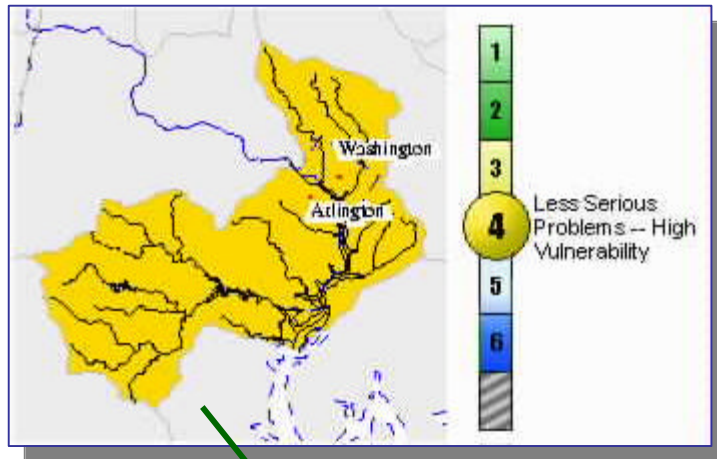


W h a t I W I d o e s *n o t* d o ?

- IWI is not a detailed site-specific information
 - data is aggregated based on the USGS 8-digit cataloging unit
- IWI is not the final word on watershed assessment
 - initial tool for source water assessment and implementing source water protection program
 - not a substitute for state source water assessment under Safe Drinking Water Act
- IWI is not a template for detailed watershed monitoring plan
 - help focus resources of government programs by inspiring more complete data collection/reporting

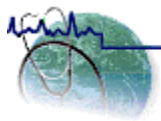


What is the Index?



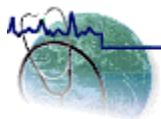
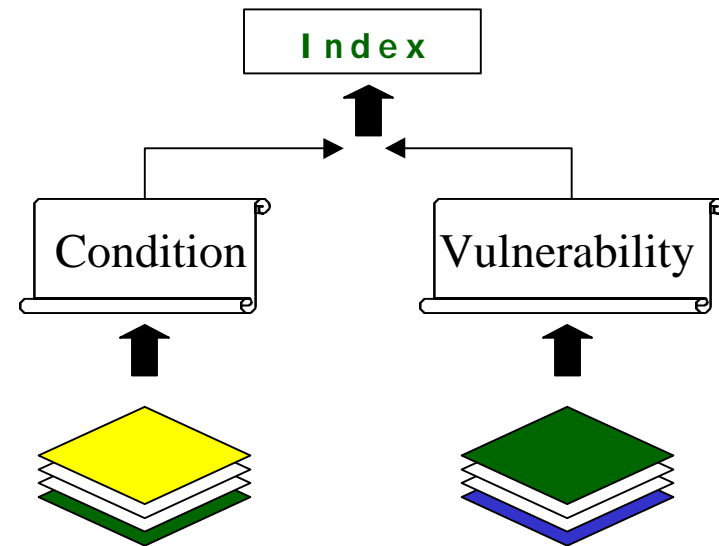
USGS 8-digit
cataloguing
unit

- Composite score of 16 watershed indicators
- Score range from 1 - 6
- Each score has two dimensions
 - condition score
 - vulnerability score
- A different score for data insufficiency



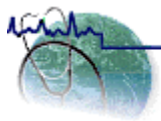
What are the Indicators ?

- Also known as “IWI Data Layers”
- 16 Indicators
 - Condition: Indicator #1 to #7
 - Vulnerability: Indicator #8 to #15, and #17
- Other Indicators Not Considered in Scoring YET
 - Candidate Indicators
 - Supporting Data Layers in the IWI Map Library



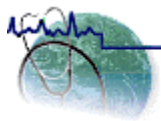
How were the indicators selected?

- 1995 Office of Water Indicators Report
 - Initial list of indicators for consideration
- Identify Data Gaps and Priorities
 - Moving from water quality to WATERSHED health
- Consult with Others
 - Policy committee, SAB, Workshops
- Phase According to Readiness
 - release
 - candidate
 - map library



What were the factors?

- National coverage
- Appropriate spatial detail for indicator - ability to summarize at 8 digit cataloging unit
- Time relevancy
- Documented quality
- Understandable
- Feasibility, e.g. cost and readiness
- Representative of watershed health
- Minimize duplication



The Indicators: Watershed Condition



Map 1: Rivers Meeting All Designated Uses



Map 2: Fish Consumption Advisories



Map 3: Indicators of Source Water Condition



Map 4: National Sediment Inventory



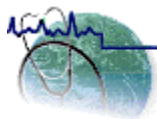
Map 5: Ambient Water Quality Data (Toxic)



Map 6: Ambient Water Quality Data (Conventional)



Map 7: Wetland Loss Index



The Indicators: Watershed Vulnerability



Map 8: Aquatic/Wetland Species at Risk



Map 9: Pollutant Loads Discharge (Toxic)



Map 10: Pollutant Loads Discharge (Conventional)



Map 11: Urban Runoff Potential



Map 12: Index of Agricultural Runoff Potential



Map 13: Population Change



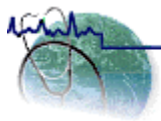
Map 14: Hydrologic Modification



Map 15: Estuarine Pollution Potential



Map 17: Atmospheric Deposition



The Indicators: Candidate Layers

Not included in overall score yet but provided for review



Map 16: Forest Riparian Habitat



Map 18: Agricultural/Urban Riparian Habitat



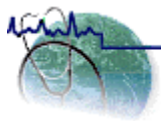
Map 19: Nitrogen Export



Map 20: Soil Permeability

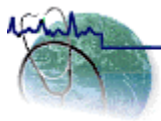


Map 21: Groundwater Nitrate Contamination



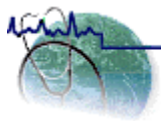
Map Library - Additional Data Layers

- Additional data layers that provide supporting information and assist in data interpretation
 - USGS Aquifer Map
 - Indian Reservation Lands
 - Streams and Roads Crossing
 - Biological integrity maps



The I W I process is constantly in motion ...

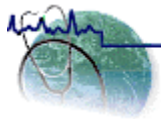
- Evolving
- Dynamic
- Cyclical



What's new on IWI

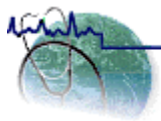
(April 1999 Release)

- Data Layer Refresh/Updates
 - New and more recent data (latest-greatest dataset)
 - Candidate indicator atmospheric deposition included in rollup
 - New candidate layer = 303d Listing
- Rollup
 - Algorithm revised to reflect addition of atmospheric deposition
- IWI Web Site
 - Redesigned web site
 - More information
 - More tools (redesigned search engine for “Where does my drinking water come from”)



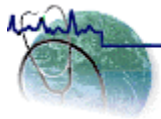
What's new on IWI: Data updates/refresh

- Data Updates
 - Map 1: Designated Uses
 - *(used latest information between 1994 and 1996)*
 - Map 3: Source Water Condition
 - *(extended period from 1990-1997 to 1990-1998)*
 - Map 5&6: Ambient Water Quality
 - *(extended period from 1990-1997 to 1990-1998)*
 - Map 9&10: Pollution Loads Discharge
 - *(replaced 1997 with 1998 data)*



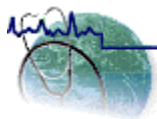
IWI Process: Rollup Algorithm

- Data Weighted by Type - Cascade Formula
 - assigns data priority
 - uses other data to interpret
- Advantages
 - indicates up-front the primary sources of data (e.g. 305b)
 - clearly shows the component data sets
- Disadvantages
 - does not clearly explain the implications of the cascade formula in the overall score
 - does not recognize the potential overlap between the various indicators



IWI Process: Rollup Algorithm

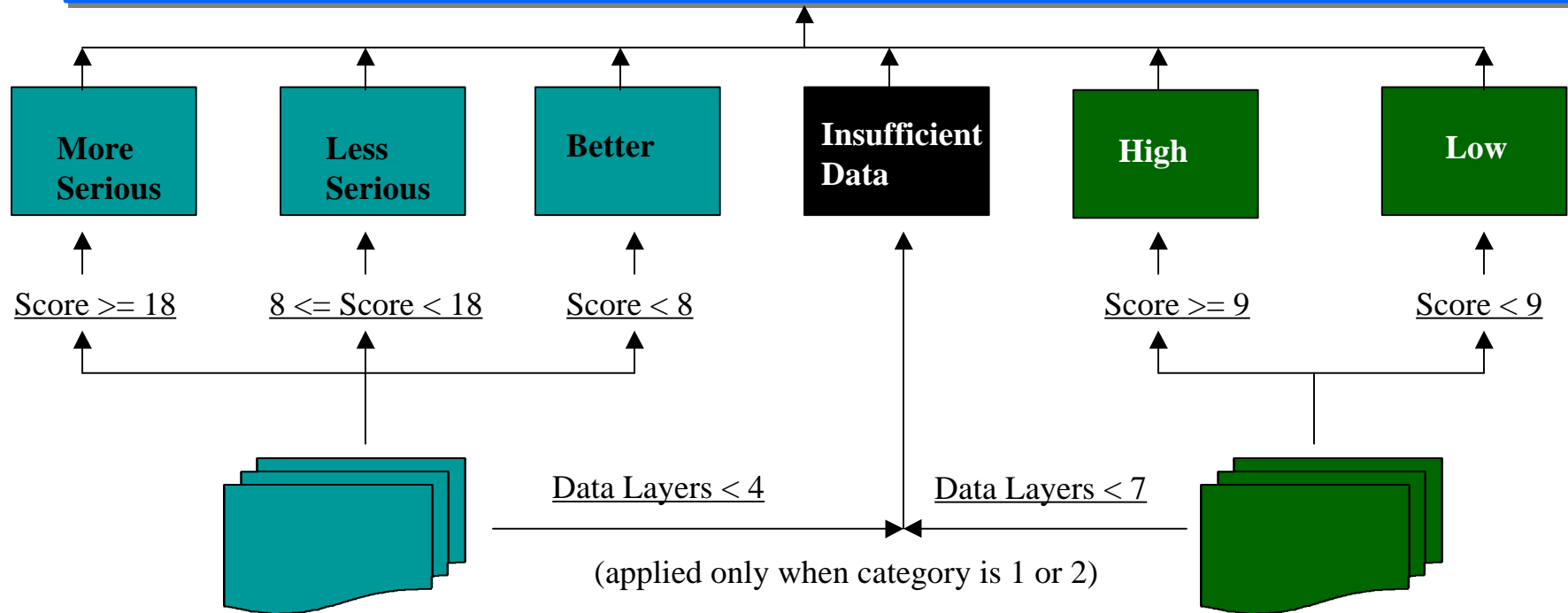
- Cascade Formula - selected by IWI Policy Committee and Office of Water
 - Best addressed goal to identify impaired watersheds
 - Allowed us to emphasize state assessment data
 - Best fit for indicators selected
- Employs simple scoring
- Keeps condition and vulnerability separate



IWI Process: Rollup Algorithm

- 1 - Better WQ, Low Vulnerability
- 2 - Better WQ, High Vulnerability
- 3 - Less Serious WQ Problems, Low Vulnerability

- 4 - Less Serious WQ Problems, High Vulnerability
- 5 - More Serious WQ Problems, Low Vulnerability
- 6 - More Serious WQ Problems, High Vulnerability
- 7 - Data Sufficiency Threshold Not Met



Data Layer 1 (weight = 6x)
 Data Layer 2 (weight = 1x)
 Data Layer 3 (weight = 1x)
 Data Layer 4 (weight = 1x)

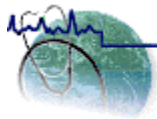
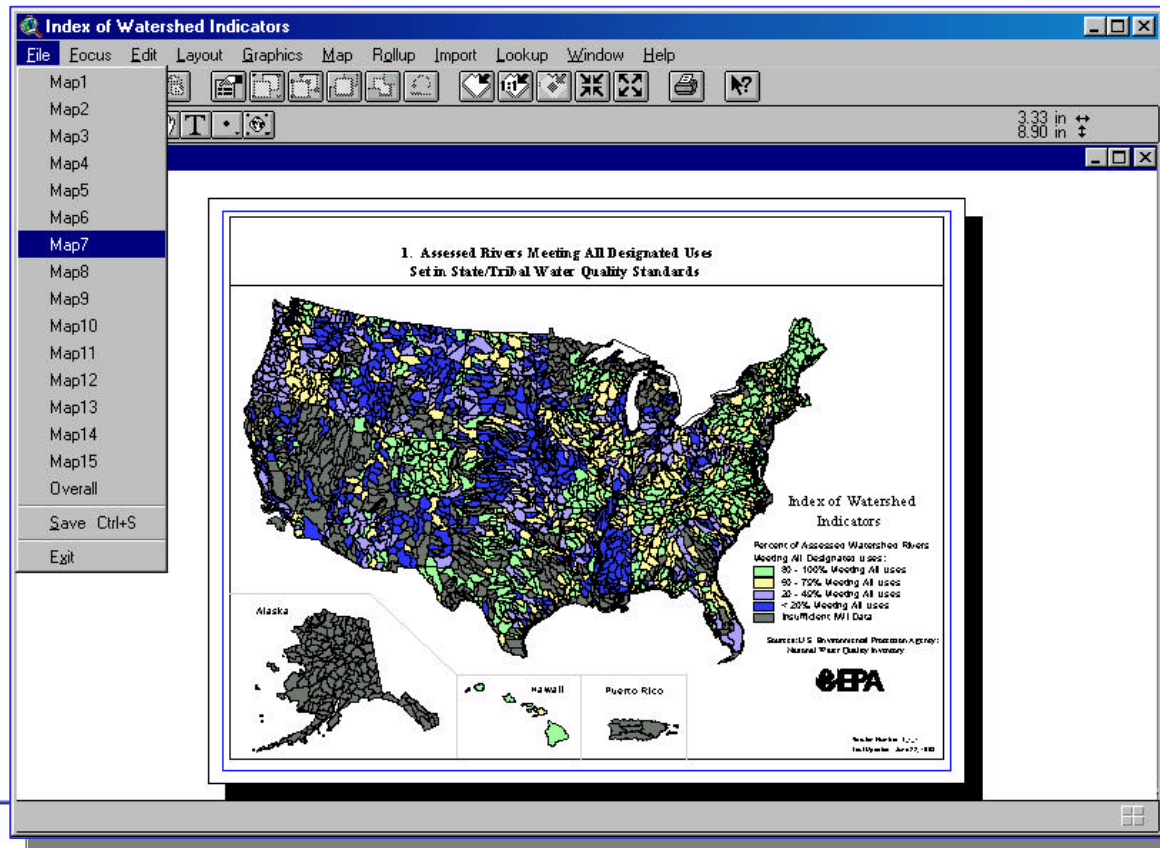
Data Layer 5 (weight = 1x)
 Data Layer 6 (weight = 1x)
 Data Layer 7 (weight = 1x)

Data Layer 8 (weight = 1x)
 Data Layer 9 (weight = 1x)
 Data Layer 10 (weight = 1x)
 Data Layer 11 (weight = 1x)

Data Layer 12 (weight = 1x)
 Data Layer 13 (weight = 1x)
 Data Layer 14 (weight = 1x)
 Data Layer 15 (weight = 1x)
 Data Layer 16 (weight = 1x)

The Rollup Algorithm - Interactive

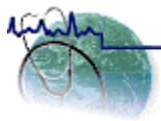
- Arcview-Based IWI Rollup Program - automates procedure



IWI Rollup Map

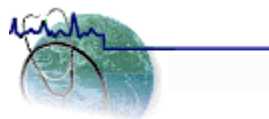
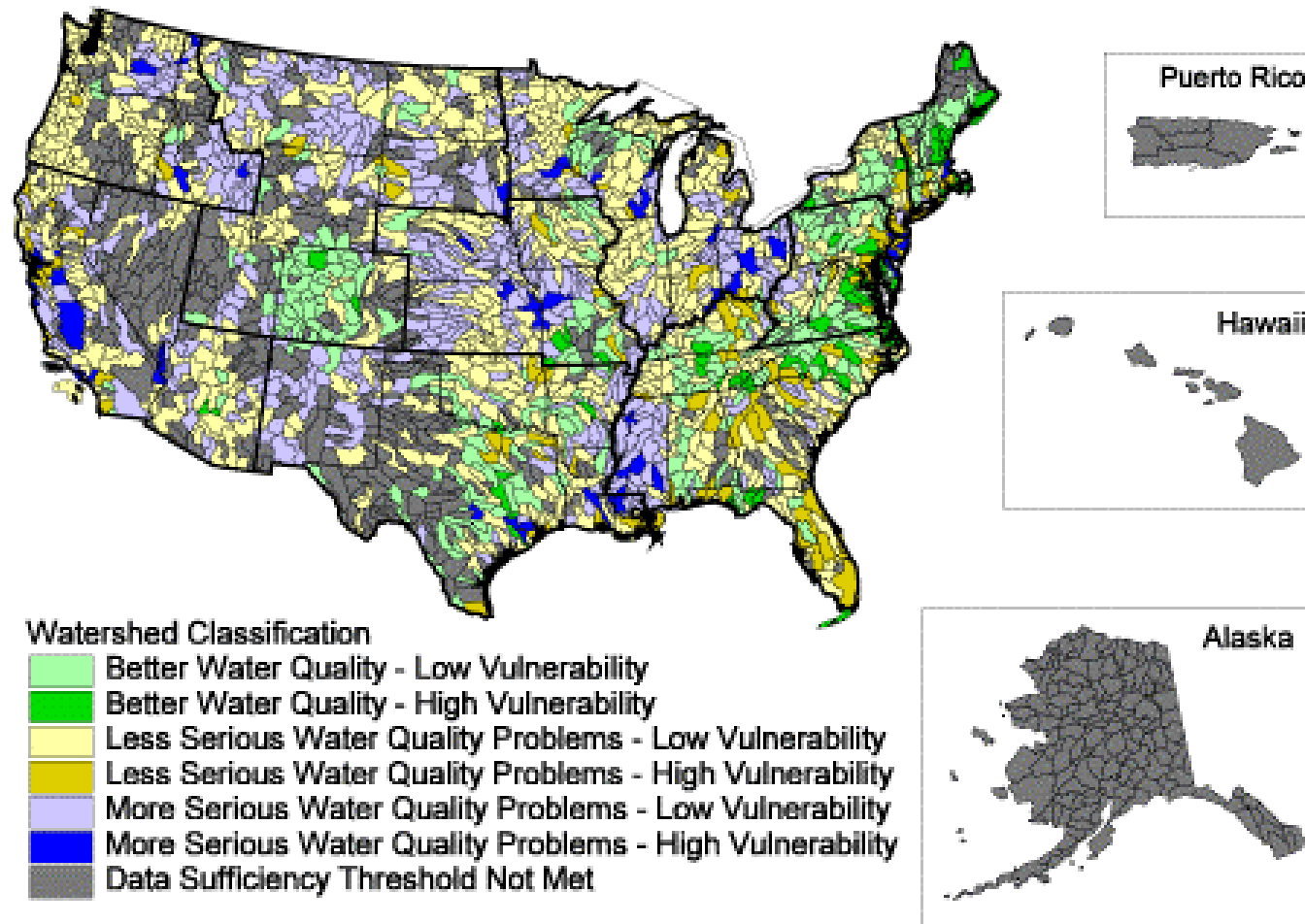
Release 1.2 (Sept. 1998) vs. Release 1.3 (April 1999)

- IWI Data Layer Refresh - Release 1.3(option a)
 - refresh of IWI data layers 1, 3, 5, 6, 9, 10
 - adopt the same rollup algorithm
- Incorporate Candidate Layer - Atmospheric Deposition Release 1.3 (option b)
 - refresh of IWI data layers 1, 3, 5, 6, 9, 10
 - include IWI data layer 17 - atmospheric deposition
 - adopt the same rollup algorithm
- Change Algorithm - Release 1.3 (option c)
 - refresh of IWI data layers 1, 3, 5, 6, 9, 10
 - include IWI data layer 17 - atmospheric deposition
 - change rollup breakpoint and data sufficiency threshold



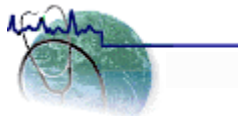
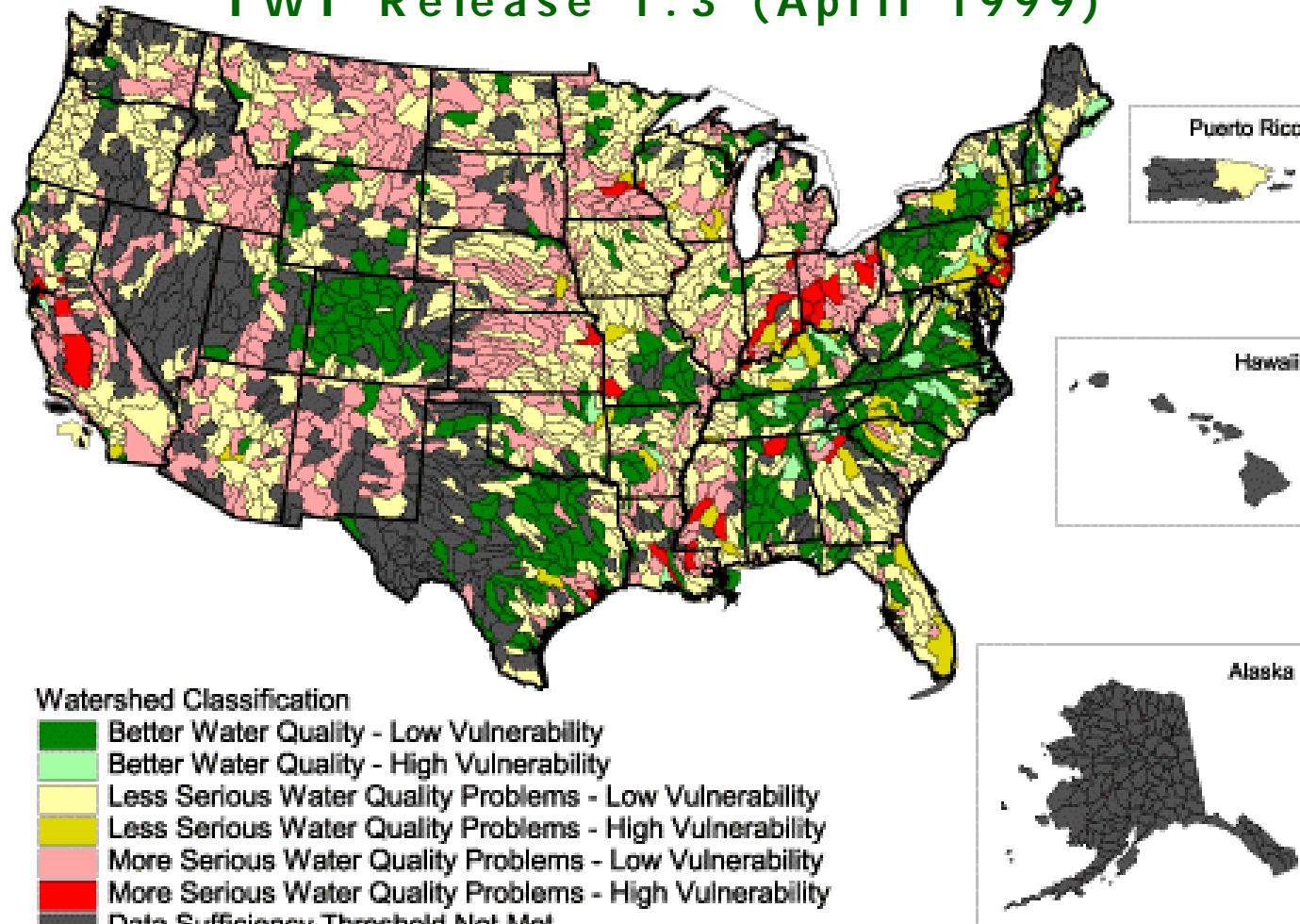
Overall Watershed Map

IWI Release 1.2 (Sept 1998)



Overall Watershed Map

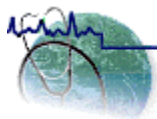
IWI Release 1.3 (April 1999)



Summary Score Table

Release 1.2 (Sept. 1998) vs. Release 1.3
(April 1999)

Category	v 1.2	v 1.3 (a)	v 1.3 (b)	v 1.3 (c)
Better WQ - Low Vuln	276	301	306	303
Better WQ - High Vuln	52	34	82	31
Less Serious WQ - Low Vuln	708	733	682	739
Less Serious - High Vuln	103	66	117	60
More Serious WQ - Low Vuln	458	478	453	480
More Serious WQ - High Vuln	49	38	63	36
Insufficient Data	615	612	558	612



Summary Score Table

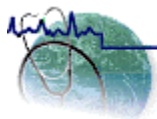
Release 1.2 (Sept. 1998) vs. Release 1.3

Category	1998 release	1999 release
Better WQ	328	334
Less Serious WQ	811	799
More Serious WQ	507	516

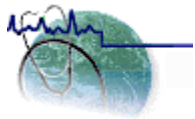
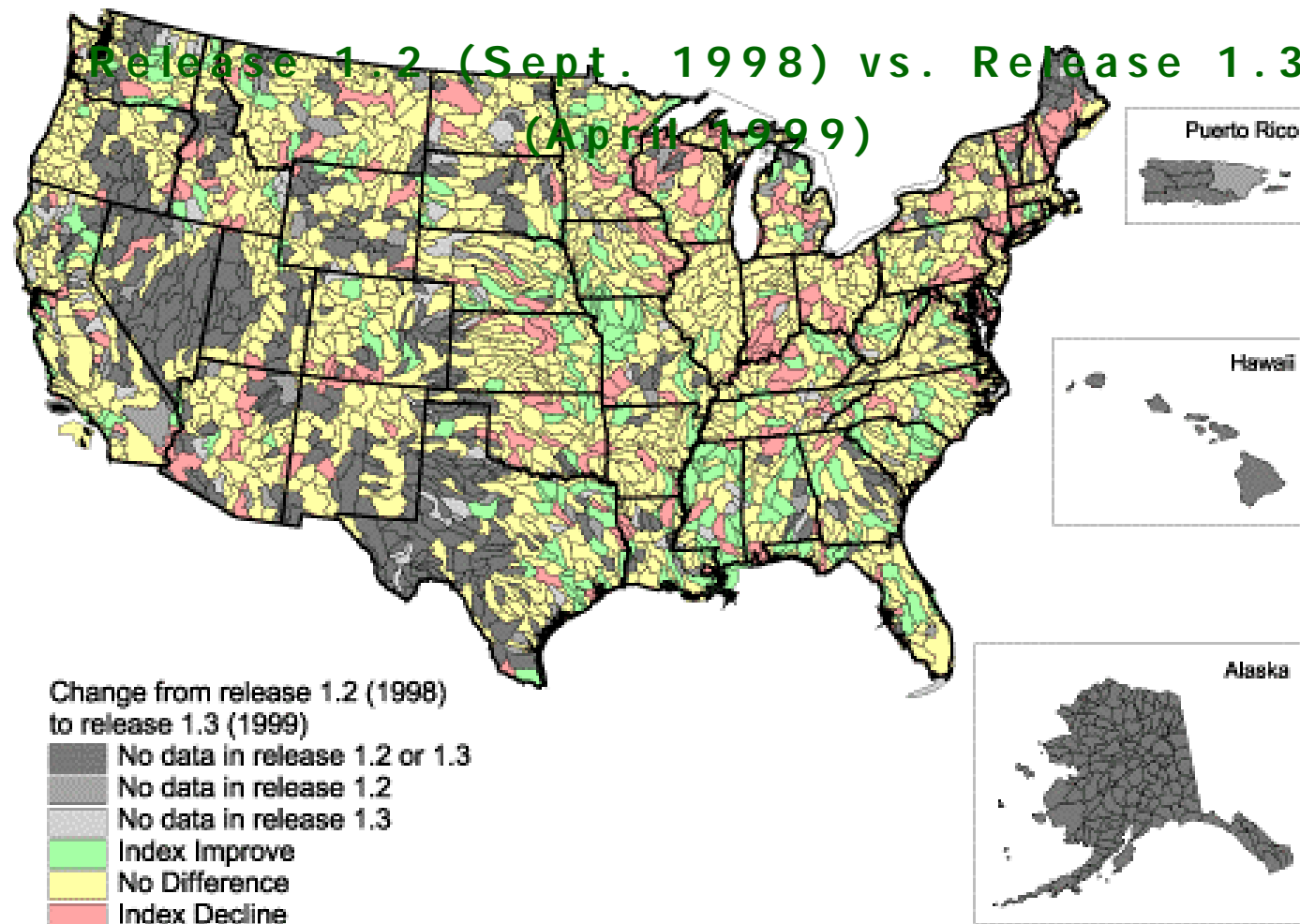
* watersheds with less serious water quality problem in 1998 becomes better or more serious in 1999

Category	1998 release	1999 release
Low Vulnerability	1442	1522
High Vulnerability	204	127

* number of watersheds with low vulnerability increased significantly



Overall National Difference Map

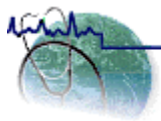


Summary Difference Score Table

Release 1.2 (Sept. 1998) vs. Release 1.3
(April 1999)

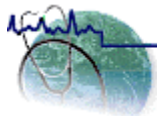
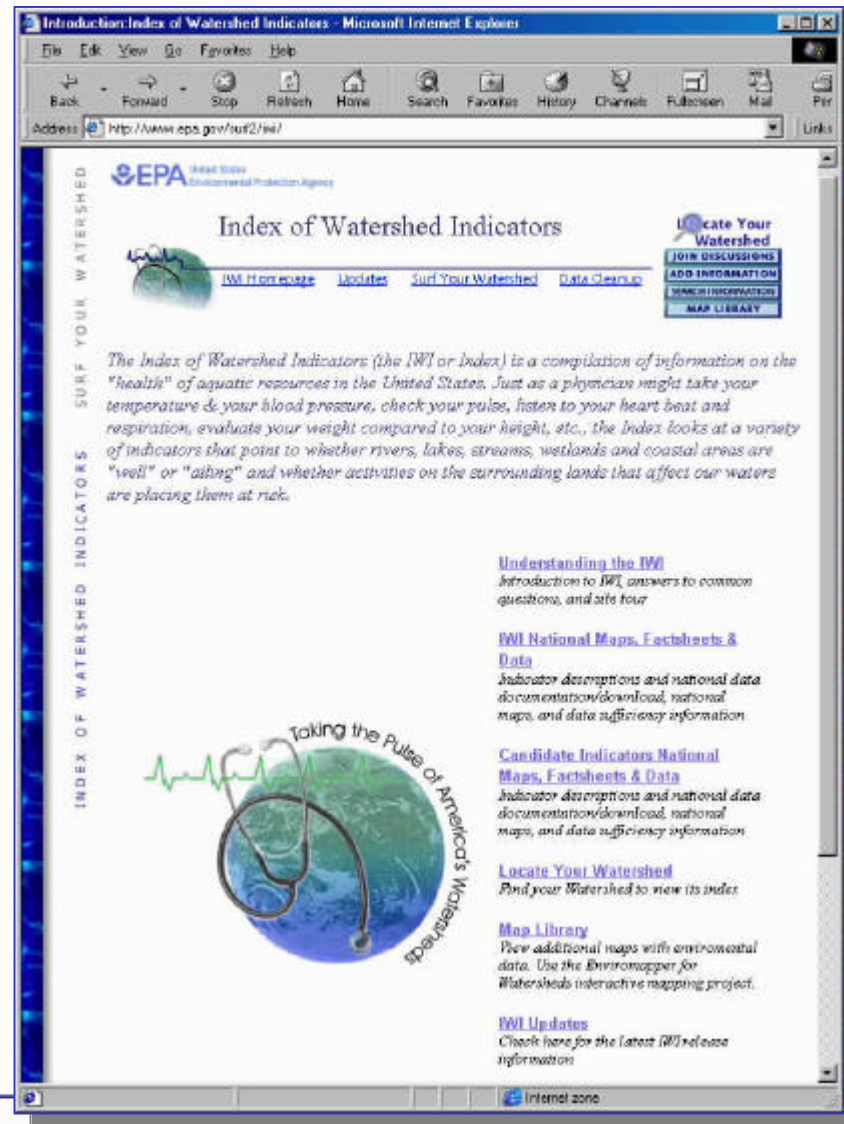
Category	IWI 9	IWI 10
Improvement	91	26
No Change	1048	1308
Decline	74	18

- * more watersheds improved in terms of PCS loading (both toxic and conventional)



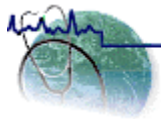
The IWI Web Site

- Internet Web Site
 - detailed indicator information at the watershed level
 - important contextual information
 - linkage to other sources of data
 - widely accessible



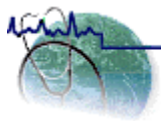
The I W I Web Site

- Redesigned web site
 - better and leaner presentation of information
 - navigable links
 - improved graphics and use of “smart” text
 - better display of scores (e.g. former skyline) and data views
- More information
 - new version and archived version
 - candidate data layers and map library
- More tools
 - new search tools for locating your watershed
 - search tool for the source watershed of your drinking system
 - [Enviromapper](#)



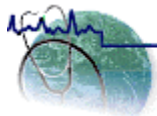
How IWI Began...

- How IWI Started:
 - Inspired by early EPA Indicators
 - Employed indicators from others
 - Guided by an Internal Work Group
 - Outside Reviews During Development
 - Coordination and Peer Review (CEIS examining cross correlation and ORD assisting with ecological indicators)
- The Target Audience
 - The Public -- Right to Know
 - Water Quality Managers
 - Academicians



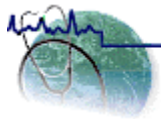
How Are We Doing?

- General State Acceptance - a “Useful Start”
- Selected State Enthusiasm
- Induced More Complete Data From Others
 - New York and Indiana are rebuilding their data systems
 - One State corrected its STORET data
 - Revised data has fewer “holes”
- Public Inquiries (~ 3 per day)
- Basis for Money Magazine Index
- Basis for an Enforcement Targeting System
- Respected Internet Presence and Clearinghouse Access to Other Sites



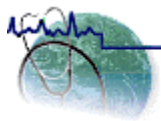
Redefining IWI Goals

- Make the IWI more comprehensive
 - Measures of program location and effort
 - Display watershed resource characteristics
- Increase IWI's precision and accuracy
 - More time-relevant data
 - Higher geographic resolution
- Make the IWI more relevant
 - CWAP, GPRA measures
 - Internal Office of Water Uses
 - More “real-world” watershed rankings
- Work for Universal acceptance
 - ORD, CEIS, Other programs



Where do we go from here?

- Expanding IWI Indicators
 - Incorporating the most wanted additions
 - ecological indicators
 - suite of groundwater indicators
 - 303(d) waters
 - designated uses
- Assist Other Indicator Efforts
 - Indicator Templates
 - Note Program Expectation
 - GPRA Benefits
- Evaluate IWI Algorithm and Recalculate if Necessary



Where do we go from here?

- Incorporate New Dimensions to IWI
 - Resource characteristics
 - Program response
- Improve IWI Presentation

